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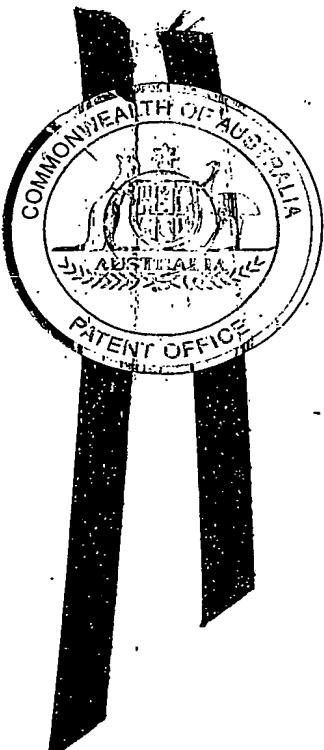
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I, SMILJA DRAGOSAVLJEVIC, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PS 3098 for a patent by UNIVERSITY OF WESTERN SYDNEY as filed on 21 June 2002.

WITNESS my hand this  
Twenty-first day of March 2003

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AUSTRALIA  
Patents Act 1990

**PROVISIONAL SPECIFICATION**

**Applicant(s) :**

UNIVERSITY OF WESTERN SYDNEY

**Invention Title:**

CLIP ASSEMBLY

The invention is described in the following statement:

## CLIP ASSEMBLY

The present invention relates to a clip that can be used with connectors for attaching concrete bodies to structures, for example in composite slabs, columns, beams or any structure attached to concrete slabs, blocks, etc.

In one form, the present invention relates to clips that can be used with shear connector studs that form the main connection between a frame structure and a concrete slab.

Australian provisional application PS1059 in the name of the applicant discloses a connector assembly for connecting a structural component to a concrete body wherein the connector assembly is capable of resisting shear forces between the structural component and concrete body and includes:

A connector having a shank with one end adapted to be embedded in concrete and the other end attached to the structural component; and

A connector element which in use surrounds the connector to form a barrier and is spaced from the connector to confine the concrete around the connector.

Australian provisional application PS1059 also discloses a composite concrete structure that includes a concrete body connected to a structural component by way of a connector assembly, which connector assembly includes:

A connector having a shank with one end embedded in the concrete body and the other end attached to the structural component; and

A connector element which surrounds the connector to form a barrier and is spaced from the connector to confine the concrete around the connector.

5           Australian provisional application PS1059 also discloses a composite structure having concrete supported by a decking on a structural framework and a plurality of connectors in the form of shear connectors, each connector including at least one stud adapted to be permanently fixed upright to the decking, and a connector element adapted to be placed on the decking and to form a barrier surrounding at least one stud a spaced distance therefrom to confine the concrete around the stud.

10           The disclosure in Australian provisional application PS1059 is incorporated herein by cross-reference.

15           An object of the present invention is to provide a clip that can be used to securely and conveniently locate connector elements of the type disclosed in Australian provisional application PS1059 to the shank of connectors of the type disclosed in the provisional application.

20           According to the present invention there is provided a clip for use with a connector assembly that, in general terms, includes (a) a connector having a shank with one end adapted to be embedded in concrete, and (b) a connector element which in use surrounds the connector to form a barrier to confine concrete around the connector, which clip includes:

25           A means for coupling the clip to an upper section of the connector element, and

A plurality of legs formed from resilient

material that extend inwardly and have inner ends that describe a circular opening that can receive the shank of the connector, and which opening has a diameter that is less than that of the shank, whereby in use the legs

5 deflect when the clip is pushed downwardly over the shank so that the shank extends through the opening and the inner ends of the legs contact the shank and thereby couple the clip to the shank.

10 The above described clip makes it possible to effectively lock the clip and thereby the connector element to the shank of the connector.

15 Preferably the legs are formed to enable the legs to flex vertically when in use the clip is pushed downwardly over the shank to locate the clip on the shank.

20 Preferably the legs are formed to enable the legs to flex vertically and horizontally when in use the clip is pushed downwardly over the shank to locate the clip on the shank.

Preferably at least one of the legs includes an upward crank.

25 The cranked end facilitates guiding the clip onto the shank.

30 In addition, the cranked end facilitates initially locating the clip in the correct orientation in relation to the shank. Specifically, the cranked end provides an obvious visual indication of the correct orientation of the clip in relation to the shank.

35 In addition, the cranked end increases resistance to upward movement of the clip after it has been located on the shank. Specifically, upward movement tends to

cause the upwardly cranked end or ends to dig into the shank and thereby increase resistance to further upward movement.

5 Preferably the leg or legs that include the cranked end further include a section that is formed to increase the flexibility of the leg.

10 The section reduces the downward force required to push the clip downwardly over the shank to locate the clip on the shank and makes it possible to control the bending stresses in the legs, thereby preventing yielding of the legs. Yielding of the legs is unsatisfactory because it prevents good engagement of the clip onto the shank.

15 Preferably the section is in the form of a curved bend in the leg outwardly of the cranked end.

20 Preferably the inner ends of the legs are relatively wide to enable the legs to grip the shank securely.

25 Preferably the inner ends of the legs include projections that enable the legs to grip the shank securely.

Preferably the legs are formed from spring steel.

30 Preferably the legs are formed so as to minimise interference to concrete flowing into the volume defined by the connector element that enclose the connector.

35 Preferably the means for coupling the clip to the upper section of the connector element includes a plurality of clasps that can clip onto the upper section of the connector element.

The present invention is described further by way of example with reference to the accompanying drawings of which:

5

Figure 1 is a vertical cross-section through a preferred embodiment of a clip in accordance with the present invention coupled to a connector element of the type disclosed in Australian provisional application

10 PS1059; and

Figure 2 is a top plan view of the clip and the connector element shown in Figure 1.

15

The connector element 3 shown in Figure 1 forms part of a connector assembly of the type disclosed in Australian provisional application PS1059.

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The connector element 3 is in the form of a steel ring that has an upper rim 5.

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Whilst not shown, the connector assembly also includes a connector in the form of a fastener that has a shank and an enlarged head that connects a component such as a decking sheet to an underlying structure prior to pouring concrete onto the decking and the connector assembly in the construction of a composite concrete structure. In this application the connector element 3 increases the ductility and shear strength, and therefore 30 the shear resistance, of the connector by forming a barrier around the connector and thereby confining concrete around the fastener.

The purpose of the clip, generally identified by the numeral 7, shown in the figures is to facilitate locating the connector element 3 securely in place in relation to the connector before concrete is poured. In 5 order to achieve this objective, the clip 7 is located first on the connector element 3 and the assembly of the connector element 3 and the clip 7 are located on the shank by positioning the clip above the shank and then pushing the clip down onto the shank.

10

The clip 3 includes a circular outer frame 9. The frame 9 includes an outer circular wall 11 that has a diameter that enables the wall to contact an inner surface of the connector element 3 when the clip 7 is coupled to 15 the connector element 3. The wall provides stability to the assembly of the connector element 3 and the clip 7.

The clip 3 also includes 4 pairs of clasps 13 that can be located over the rim 5 of the connector 20 element 3 and couple the clip 7 securely to the connector element 3.

The clip 7 also includes 4 equally spaced legs 15 extending inwardly from the frame 9.

25

The legs 15 are formed from spring steel. The legs 15 terminate in inner ends 17 that describe a circular opening 19 for receiving the shank of the connector. As described above, the diameter of the 30 described opening 19 is selected to be less than that of the shank so that the legs 15 engage and thereby couple the clip to the connector when the clip is pushed down onto the shank.

The legs include upwardly inclined sections 21 that define a frusto-conical region around the shank. As is described above, these upwardly cranked sections 5 provide a number of advantages, including facilitating guiding the clip onto the shank, facilitating initially locating the clip in the correct orientation in relation to the shank, and increasing resistance to upward movement of the clip after it has been located on the shank.

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It will be understood by a person skilled in the art of the present invention that many modifications may be made without departing from the spirit and scope of the present invention.

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By way of example, whilst the preferred embodiment includes 4 legs 15, the present invention is not so limited and extends to clips having any suitable number of legs.

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In addition, whilst the preferred embodiment includes radially extending legs 15, the present invention is not so limited and extends to legs that are not radial legs.

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In addition, whilst the preferred embodiment includes upwardly inclined sections 21 that define a frusto-conical region around the shank, the present invention is not so limited.

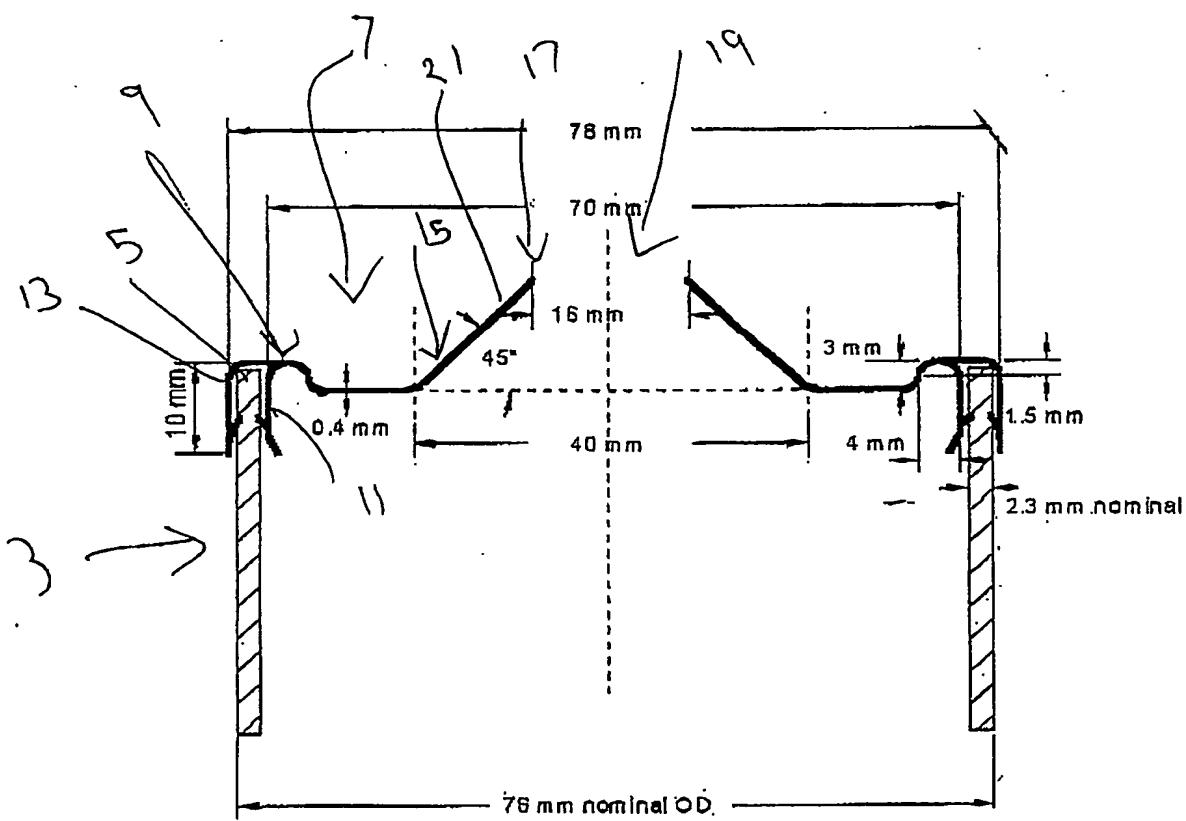


Figure 2

